LLNL Environmental Restoration Division (ERD)
Standard Operating Procedure (SOP)

ERD SOP 2.4: Sampling Monitor Wells with a Bailer—Revision: 6

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1.0 PURPOSE

The purpose of this SOP is to provide guidance on collecting a representative ground water sample using a bailer.

2.0 APPLICABILITY

This SOP procedure applies to all field personnel using a bailer to purge and collect ground water samples from a monitor well.

3.0 REFERENCES

3.1 deVera, E. R., B. P. Simmons, N. D. Stephen, and D. L. Storm (n.d.), *Samplers and Sampling Procedures for Hazardous Waste Streams*, U.S. EPA, Washington, D.C. (EPA-600/2-80-018).

3.2 Ford, P. J., P. J. Tarina, and D. E. Seely (1984), *Characterization of Hazardous Waste Sites—A Methods Manual, 302. Vol. II of Available Sampling Methods,* 2nd ed., U.S. EPA, Washington, D.C. (EPA/600/4-84/076).

3.3 Korte, N. and D. Haley (1983), *Procedures for Field Chemical Analyses of Water Samples,* U.S. Department of Energy, GJ/TMC-07, Technical Measurements Center, Grand Junction Project Office, Grand Junction, Colo.

3.4 Korte, N. and P. Kearl (1985), *Procedures for the Collection and Preservation of Groundwater and Surface Water Samples and for the Installation of Monitoring Wells*, Second Edition, U.S. Department of Energy, GJ/TMC-08, Technical Measurements Center, Grand Junction Projects Office, Grand Junction, Colo.

3.5 National Council of the Paper Industry for Air and Stream Improvement, Inc. (1982), *A Guide to Groundwater Sampling,* National Council for the Paper Industry Technical Bulletin No. 362.

3.6 U.S. Department of the Interior, (n.d.), *National Handbook of Recommended Methods for Water-Data Acquisition*, Washington, D.C.

3.7 U.S. EPA (1983), *Methods for Chemical Analysis of Water and Wastes,* Washington, D.C. (EPA-600/4-79-020).

3.8 U.S. EPA (1994), *Test Methods for Evaluation of Solid Waste,* Third Edition, Washington, D.C. (EPA-SW-846).

3.9 U.S. EPA (1985), *Practical Guide for Groundwater Sampling*, Washington, D.C. (EPA-600/2-85/104).

3.10 U.S. EPA (1986), *RCRA Groundwater Monitoring Technical Enforcement Guidance Document*, Washington, D.C. (OSWER-9950.1).

3.11 U.S. EPA (1992) *RCRA Groundwater Monitoring: Draft Technical Guidance*, Washington, D.C. (EPA/530-R-93-001).

4.0 DEFINITIONS

See SOP Glossary.

5.0 RESPONSIBILITIES

5.1 Division Leader

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site and Site 300 are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

5.2 Field Personnel

The field personnel are responsible for the safe completion of evacuating and sampling ground water monitor wells according to guidelines set forth by this procedure and associated SOPs.

5.3 Field Support Personnel

The field support personnel's responsibilities are to provide the appropriate equipment, collection devices, and general field support to assure that field activities are performed in a timely and efficient manner. Field support personnel are also responsible for adhering to all applicable ERD SOPs.

5.4 Sampling Coordinator (SC)

The SC's responsibility is to supply a quarterly Sampling Plan. In addition to providing a quarterly Sampling Plan, the SC may provide a specific sample plan for each day (Daily Operations Guide [DOG], SOP 2.1, "Pre-sample Purging of Wells," Attachment A). The technical information required for purging wells may also be provided by the SC in the Well Specification Table, Technical Information Spreadsheet or as part of electronically generated Ground Water Sampling Data Sheets.

6.0 PROCEDURES

6.1 Bailer Construction

Where approved by the SC, it is acceptable to use a Teflon, stainless steel, polyethylene, or polyvinyl chloride (PVC) bailer. SOP 2.1, "Presample Purging of Wells," Attachment E is a schematic of a typical bailer. Collection of an equipment blank sample may be necessary when using a reusable bailer, consult SOP 4.9, "Collection of Field QC Samples" for this determination.

6.2 Discussion

Bailers are useful tools for the collection of grab samples. Excessive agitation of the ground water should be avoided since this action results in aeration of the ground water sample. Unnecessary agitation of the ground water can be minimized by gently lowering the bailer into the well (not dropping it), and by using a bailer that can be fitted with a bottom-emptying device. Some bailers have a threaded check-ball opening, which allows the attachment of a threaded stop-cock. The stop-cock allows greater control when sampling with a bailer. Attachment E in SOP 2.1, "contains a schematic of a bailer and stop-cock. Polyethylene bailers also have a bottom-emptying device which slips into the bottom opening.

6.3 Preparation

6.3.1 Prior to commencement of field activities, perform preparation activities described in SOP 4.1, "General Instructions for Field Personnel." Field personnel shall review the appropriate Site Safety Plan (SSP), and all applicable SOPs, Operational Safety Procedures (SOPs), and Integration Work Sheets (IWSs). Current copies of all appropriate documents shall be retained by the field personnel at all times.

6.3.2 Review all pertinent sampling information, such as the quarterly Sampling Plan, Well Specification Table, Technical Information Spreadsheet, and electronically generated Ground Water Sampling Data Sheets (if applicable) provided by the SC. The plan contains the following information:

- Locations to be sampled.
- Proposed sampling methods (See SOP 2.1, Attachment B, Methodology Sampling Codes).
- Requested analyses.
- Contract analytical laboratory (CAL) to which samples are to be sent for analyses.
- Estimated amount of purge water to be collected.
- Current technical information for each well.

6.3.3 Obtain appropriate data collection forms i.e., Chain-of-Custody (CoC) forms, Ground Water Sampling Data Sheets (SOP 2.1, Attachment C), assigned Document Control Logbook, labels, and any necessary shipping forms.

Instructions for completing the logbook entries and field forms are provided in SOP 4.2, "Sample Control and Documentation. Consult with the SC for the appropriate pre-sample purging method to apply to the site if it is not indicated on the sampling plan.

6.3.4 The appropriate number and type of sample containers needed for the sampling event should be obtained from the sample bottle inventory. The type of analysis for which a sample is being collected determines the type of bottle, preservative, holding time, and filtering requirement. See SOP 4.3, "Sample Containers and Preservation."

6.3.5 The appropriate personnel should keep a sufficient stock of sample containers and maintain an inventory of supplies (i.e., disposable 0.45 µ fiber filters, trip blanks, field blank water (ordered from the contract analytical laboratory (CAL), plastic bags, etc.), to ensure adequate sampling supplies are available at all times.

6.3.6 Locate the line to be used when lowering the bailer into the well. Nylon rope should be used. The rope used for bailing should be new or dedicated to the monitor well to be sampled.

6.3.7 The field personnel will notify the Site 300 SC when collecting samples with short holding times (i.e., hexavalent chromium, fecal and total coliform). At Livermore Site, the SC will notify the sampler via the DOG. The SC or appropriate personnel will alert the CAL when such samples are being collected so the laboratory can prepare for the analysis.

6.3.8 Organize sampling route:

A. Site 300

1. Complete an entire study area before beginning the next, when possible.
2. Proceed to sample wells, working from the least contaminated to the most, when possible.

B. Livermore Site

The Livermore Site SC may specify the order of well sampling. Livermore Site contains overlapping study areas which are not hydrogeologically isolated. When working with portable equipment, sample wells from the least to the greatest contaminant levels, as directed, by the SC.

6.3.9 The Administrative Escort Services must be given a 24-hour notice (at a minimum) before work is scheduled in restricted areas.

6.3.10 Decontaminate nondedicated bailers according to SOP 4.5, "General Equipment Decontamination." Bailers should be checked for cracks and breaks that could cause sample and/or bailer loss. Ensure that new, clean rope is used and is cut to the appropriate length according to the casing depth of the well.

6.3.11 Enter the required information on the appropriate Ground Water Sampling Data Sheet and Document Control Logbook per the instructions in SOP 4.2, "Sample Control and Documentation." When using the electronically generated Ground Water Sampling Data Sheets all the initial information is already provided and should be checked.

6.4 Purge Water Collection

6.4.1 At Site 300, the field support personnel must ensure that wells have sufficient collection drums available at the well head for purge water containment (SOP 4.7B, "Site 300 Treatment and Disposal of Well Development and Well Purge Fluids"). The quantity of purge water to be collected for each well is listed in the quarterly Sampling Plan or calculated by the SC for newly installed monitor wells.

6.4.2 The Livermore Site field personnel will tow a collection tanker with the sampling vehicle and when necessary, the SC may provide a specific order of wells to be sampled. Tankers and drums filled with purge water may not be left at the well location and will be logged and disposed of daily, when possible according to SOP 4.7A, "Livermore Site Treatment and Disposal of Well Development and Well Purge Fluids."

6.5 Operation

6.5.1 Once pre-sample purging is complete according to SOP 2.1, sampling may begin. Wear a pair of clean disposable gloves during sampling. Temperature, pH, and specific conductance should be measured immediately prior to sampling according to SOP 2.2, "Field Measurements on Surface and Ground Waters." Instruments should be calibrated according to SOP 4.8, "Calibration/Verification and Maintenance of Field Instruments Used in Measuring Parameters of Surface and Ground Water and Soils."

6.5.2 The retrieval line should be carefully measured to ensure that the influent portion of the bailer is at the targeted sample depth and securely attached to the bailer.

6.5.3 The free end of the retrieval line should be securely fastened to the protective casing or the sampler to avoid losing the bailer in the well.

6.5.4 Lower the bailer gently into the well until the bailer is within the screened section of the well. Avoid unnecessary agitation of the water.

6.5.5 Remove the bailer and attach the bottom-emptying device. A ring stand fitted with clamps to hold the bailer greatly facilitates this procedure.

6.5.6 Fill the appropriate sample bottles (SOP 4.3, "Sample Containers and Preservation") from the bottom-emptying device. Allow water to flow gently down the side of the bottle with minimal entry turbulence (SOP 2.6, "Sampling for Volatile Organic Compounds"). If a bottom-emptying device is not available, obtain the sample by gently pouring from the top of the bailer, avoiding excessive agitation.

6.5.7 Samples should be obtained in order of volatility; VOCs collected first, followed by semi VOCs, inorganics, and radiologicals. All samples should be placed in sealable-type bags. The samples requiring preservation of 4°C should be cooled down by using blue ice packs in sealable-type bags or bagged ice cubes. Loose ice may be used when samples need to be rapidly cooled, but should be replaced with bagged or blue ice before shipping.

6.5.8 If filtering and/or preservation is required, include the "FILTER" requested analysis and a notation on the CoC instructing the CAL to filter and/or preserve samples upon receipt. Alternatively, an electrical vacuum-pump filtration device fitted with a disposable 0.45 μm fiber filter can be used as long as it is not constructed from materials that may interfere with the analyses, and is approved by the SC.

6.6 Post Operation

6.6.1 Perform post operation activities per SOP 4.1.

6.6.2 Before leaving the sampling location, verify that the appropriate samples have been collected according to the samples scheduled on the Ground Water Sampling Data Sheets.

6.6.3 Prior to sampling another site and to prevent cross contamination of equipment between locations, thoroughly decontaminate all equipment that is not dedicated according to SOP 4.5, "General Equipment Decontamination."

6.6.4 Complete the appropriate Ground Water Sampling Data Sheet and record sampling information in the assigned Document Control Logbook (SOPs 2.1 and 4.2).

6.6.5 Verify that the CoC is appropriately completed per SOP 4.2. Indicate any special instructions in the Remarks Section of the CoC. Such instructions may include a request for the laboratory to filter and preserve the sample upon receipt. Also, for wells that are listed on the sampling plan as Clean Wells or for any well that is expected to be free of contamination write, "Verify any positive detections and call _____." The blank should be filled in with the appropriate QC Chemist's name and phone number.

6.6.6 Deliver Ground Water Sampling Data Sheets and CoC forms to the SC daily. Hand carry or mail copies of the completed CoCs to the Technical Release Representative (TRR) daily.

6.6.7 The SC will retain a copy of the original forms (CoC, Ground Water Sampling Data Sheet), and provide the originals to the Data Management Team (DMT) for final archive. The SC will provide copies of the forms to the appropriate Operations and Regulatory Affairs Division Analyst, as necessary.

6.6.8 Leave routine samples and proper documentation in the environmental sample lock-box for the CAL. Field personnel will ship samples and/or distribute to the appropriate laboratories. Ensure that the samples requiring refrigeration remain at 4°C ± 2°C, but do not allow them to freeze. Always ensure that proper CoC is maintained.

7.0 QA RECORDS

7.1 Ground Water Sampling Data Sheets

7.2 Document Control Logbook

7.3 Chain-of-Custody forms

8.0 ATTACHMENTS

Not applicable.